## WHAT IS CLAIMED IS:

- 1. A fuel-cell which has at least one direct-alcohol fuel cell, the cell having a structure comprising:
- a first electrode;
- 5 a second electrode;
  - an electrolyte arranged between the first electrode and the second electrode;
  - means for conducting electrical current to the first electrode and
- the second electrode, wherein said structure is miniaturized, made up of a plurality of layers set on top of one another and associated in an unremovable way to a flexible substrate.
- 2. The fuel-cell according to Claim 1, wherein there is provided a plurality of said cells on the same flexible substrate, associated to which, in an unremovable way, is the miniaturized layer structure of each cell.
- 3. The fuel-cell according to Claim 1, wherein the flexible substrate is made of polymeric material, in particular Kapton®.
  - 4. The fuel-cell according to Claim 2, wherein associated to the flexible substrate, in an unremovable
- 25 way, are delivery means for delivering a fuel to each cell and discharge means for emptying water from each cell.
  - 5. The fuel-cell according to Claim 2, wherein associated to the flexible substrate in an unremovable
- 30 way are conducting paths, which electrically connect each cell to the next one.
  - 6. The fuel-cell according to Claim 1 or Claim 2, wherein the means for conducting electrical current comprise a first layer of metallic material resting on
- 35 the flexible substrate and in that the first electrode

comprises an anodic catalyst in contact with said first layer.

- 7. The fuel-cell according to Claim 1 or Claim 2, wherein the means for conducting electrical current comprise a second layer of metallic material resting on the electrolyte and in that the second electrode comprises a cathodic catalyst in contact with said second layer.
- 8. The fuel-cell according to Claim 7, wherein on said second layer there is present a protective layer, in particular made of polymeric material.
  - 9. The fuel-cell according to Claim 1 or Claim 2, wherein the electrolyte is in the form of a membrane, in particular made of Naphion.
- 15 10. The fuel-cell according to Claim 1 or Claim 2, wherein the electrolyte has a composite structure comprising Naphion and zeolite.
- 11. The fuel-cell according to Claim 1 or Claim 2, wherein the means for conducting electrical current to the first electrode and the second electrode are in the form of metallic layers.
  - 12. The fuel-cell according to Claim 1, wherein at least one between the first electrode and the second electrode comprises a catalyst containing granules of carbon and a noble metal selected in the group consisting of platinum, palladium, rhodium, iridium,

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osmium and ruthenium.

nanotubes, carbon nanofibres.

- 13. The fuel-cell according to Claim 1, wherein at least one between the first electrode and the second electrode comprises a catalyst containing a material selected in the group consisting of fullerenes, carbon
- 14. The fuel-cell according to Claim 1, wherein at least one between the first electrode and the second electrode comprises a catalyst deposited on zeolite

material.

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- 15. The fuel-cell according to Claim 1, wherein it comprises a first control part and a second energy-generation part, the first part having a micro-pump,
- 5 which is operative for regulating the supply of the fuel to the cells, the micro-pump comprising:
  - a respective inlet branch, for connection to a source of the fuel; and
- a delivery branch, for connection to the delivery 10 means.
  - 16. The fuel-cell according to Claim 15, wherein the pump is of the piezoelectric type and made using MEMS (Micro Electro-Mechanical Systems) technology.
- 17. The fuel-cell according to Claim 15, wherein the micro-pump is operative for maintaining the cells moist in order to prevent deterioration of said miniaturized structure.
  - 18. The fuel-cell according to Claim 15, wherein the first part comprises a microcontroller for the control of the micro-pump.
  - 19. The fuel-cell according to Claim 15, wherein the first part comprises a supercapacitor provided for electrical connection to a cell.
- 20. The fuel-cell according to Claim 19, wherein the supercapacitor is operative for supplying the microcontroller.
  - 21. The fuel-cell according to Claim 15, wherein the second part comprises the flexible substrate with the respective cell or cells, and that the first part is
- 30 distinct from the flexible substrate and provided for being connected electrically and hydraulically to a cell of the second part.
- 22. The fuel-cell according to Claim 1 or Claim 2, wherein the flexible substrate is in the form of a ribbon developing in length and capable of being rolled

up.

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- 23. The fuel-cell according to Claim 1 or Claim 2, wherein the fuel is methanol in aqueous solution.
- 24. A method for the fabrication of a fuel-cell, which has at least one direct-alcohol fuel cell, the cell 5 comprising: a first electrode; a second electrode; an electrolyte, arranged between the first electrode and the second electrode; means for conducting electrical current to the first electrode and the second electrode, said method wherein 10 being there envisaged the steps of:
  - i) obtaining a flexible substrate in the form of a ribbon that develops in length;
- ii) associating to the flexible substrate, in an 15 unremovable way, a plurality of said cells, the latter each having a structure with layers set on top of one another obtained by means of micromachining;
  - iii) cutting the flexible substrate in order to obtain a piece comprising a desired number of said cells,
- 20 iv) electrically connecting a cell of the piece to a control device, the ensemble of the piece and of the control device forming the fuel-cell.
  - 25. The method according to Claim 24, wherein before step iii) there is envisaged the step of associating to
- the flexible substrate delivery means for delivering the fuel to each cell and discharge means for emptying water from each cell.
  - 26. The method according to Claim 24, wherein before step iii) there is envisaged the step of associating to
- 30 the flexible substrate conducting paths that electrically connect two cells together.
  - 27. The method according to Claim 25, wherein step iv) comprises a substep of hydraulic connection of a pump forming part of said device to the delivery means of a cell of the piece.

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- 28. The method according to Claim 26, wherein step iv) comprises a substep of electrical connection of a supercapacitor forming part of said device to the conducting paths of a cell of the piece.
- 5 29. The method according to Claim 24, wherein the flexible substrate is wound up after step iii) to form a roll.
- 30. The method according to Claim 28, wherein the portion of flexible substrate designed to form the piece is unwound from the roll, in order to carry out step iv).